and said sealed chamber that results from said purging fluid flow through said first restrictor of said outlet device;

monitoring at a second differential pressure switch the difference in pressure between said sealed chamber pressure and the pressure outside of said enclosure that results from said purging fluid flow through said second restrictor of said outlet device; and

A13 Cont'd

determining that either said first or second restrictors are blocked when said second or said first switches, respectively, are open when said purging fluid flows.

30. The method of claim 29 further comprising determining that said purging fluid flow is passing through said outlet device and not leaking out of said enclosure in another location if both of said differential pressure switches are closed.

REMARKS

Applicant has amended the title and believes for the reasons given below that this amendment overcomes the objection to the title. Applicant has amended the paragraphs that start at line 14 on page 1; line 33 on page 4; line 2 on page 7 and line 15 on page 7 and claim 6 all as filed to correct obvious and inadvertent errors therein.

Applicant has amended the paragraph that starts at line 4 on page 5 of the application as filed to add to the end thereof the words "that the gas flow be monitored at the outlet of the enclosure 11." Support for this addition is found at lines 19-21 on page 2 of the application as filed and thus does not constitute new matter. Applicant has amended the paragraph that starts at the bottom of page 5 of the application as filed to delete therefrom the reference to sections 3.1 and 3.2 of EN 50016 and IP40 and to correct an obvious error in that the word "partial" when used in connection with "barrier" makes no sense in the context of the art to which this invention relates.

Applicant has amended independent claims 1, 11, 16, 19 and 26 to recite in each of those claims that the fluid must flow

in its entirety through the first and second restrictors in the sealed chamber (claims 1, 19 and 26) or through the inlet and outlet of the sealed chamber (claims 11 and 16). These amendments are fully supported by the application as filed as the drawing Figs. 2, 5-8 all show the sealed chamber with no means by which the fluid cannot flow in its entirety through the chamber. Applicant has added new independent claims 28 and 29 each to a method and each of these independent claims also require that the fluid must flow in its entirety through the first and second restrictors which are in the sealed chamber. The additional fee for new claims 28-30 is to be charged to a deposit account as is shown on the Transmittal accompanying this Amendment.

Applicant has amended the Summary of the Invention so that it is consistent with the amendments made to independent claims 1, 11, 16, 19 and 26 and to the addition of new independent claims 28 and 29.

The Objections To The Specification

The Examiner has objected to the specification saying that the incorporation of essential material in the specification by reference to a publication is improper.

Section 6.08.01(p) of the MPEP defines essential material and describes nonessential subject matter as follows:

'Essential material" is defined as that which is necessary to (1) describe the claimed invention, (2) provide an enabling disclosure of the claimed invention, or (3) describe the best mode (35 U.S.C. 112). In any application which is to issue as a U.S. patent, essential material may not be incorporated by reference to (1) patents or applications published by foreign countries or a regional patent office, (2) non-patent publications, (3) a U.S. patent or application which itself incorporates "essential material" by reference, or (4) a foreign application.

Nonessential subject matter may be incorporated by reference to (1) patents or applications published by the United

States or foreign countries or regional patent offices, (2) prior filed, commonly owned U.S. applications, or (3) non-patent publications. Nonessential subject matter is subject matter referred to for purposes of indicating the background of the invention or illustrating the state of the art.'

The Examiner does not state which of the several references in the application as filed to various ENs are essential material. The references in the Description of the Prior Art portion of the application are clearly not essential material as they are not used to describe the claimed invention or provide an enabling disclosure of the claimed invention or describe the best mode.

The invention is a fluid flow sensor. The only references to material incorporated by reference in the Description of the Preferred Embodiment(s) portion of the specification occur on page 5 and page 6.

The reference at lines 12-14 on page 5 is that the sensor meets the requirement of EN 50016 second edition. That requirement is set forth at lines 20 and 21 of on page 2 of the application as filed as the monitoring by sensor 20 of the gas flow at the outlet of the enclosure 11 shown in Fig. 2 of the application as filed. The claimed invention is described without that reference as the sensor 20 is shown in the enclosure outlet in the drawing figures. The disclosure of the claimed invention is enabling without that reference as the application as filed at many places, for example, line 25 on page 4 to "detected" in line 12 on page 5 and the paragraph that starts at line 15 on page 5 and the table below that paragraph more than provides the enabling disclosure. That reference is not essential material because the application describes several embodiments for the sensor of the present invention and the best mode for each such embodiment is shown in the associated drawing figure(s) and is described in the associated text without the need to refer to that reference. Therefore applicant submits that the subject at lines 12-14 on page 5 is nonessential

material.

The reference to EN 50016 and IP40 in the paragraph that starts at the very bottom of page 5 of the application as filed have been deleted.

Therefore for the reasons given above, applicant hereby requests reconsideration of the objection to the specification as improperly incorporating essential material by reference.

The Examiner has also objected to the Title as not descriptive and applicant has amended the Title to "Fluid Flow Sensor" which applicant submits is descriptive of the invention described in the application as filed.

For the reasons submitted above applicant hereby request reconsideration of the objection to the Title.

The Rejection of the Claims

a) The Rejection Under 35 U.S.C. 102(b)

The Examiner has rejected claims 1-5, 8-13, 16, 18-20, 23, 26 and 27 under 35 U.S.C. 102(b) as anticipated by U.S. Patent No. 4,662,798 (Fassbinder). In support thereof the Examiner says that Fassbinder in Figs. 1 and 2 shows an enclosure, but does not say where the enclosure is shown in the drawing figures of Fassbinder, that has an opening through which a fluid flows, a flow sensor that has two switches 31, 33 and a sealed chamber 24 in the opening, with the chamber having an outlet and two restrictors 21, 22 through which the fluid can flow and means to transfer pressures.

The reference numerals referred to by the Examiner are those shown in the embodiment of Fig. 2 in Fassbinder. In that embodiment carrier gas enters a cyclone 24 through a constriction 21 by way of conveyor pipe line 20. A quantity of the carrier gas is removed from the cyclone by way of discharge pipe 25 which has a valve 26 therein. The removed quantity of carrier gas is fed back to the main quantity of carrier gas by way of pipe 23 after the constriction 23. Thus the carrier gas does not in its entirety flow through both restrictions as called for in applicants amended independent claims 1, 11, 16,

19 and 26 and new independent claims 28 and 29.

In the embodiment of Fig. 1 a solid-particle gas suspension flows in pipe 1 from left to right. The carrier gas is supplied to pipe 1 through control valve 7 by way of pipe 8 and collar 6. The pipe 1 has two constrictions 3 and 4 and the carrier gas enters pipe 1 after constriction 3 and before constriction 4 and since the flow is left to right through pipe 1 the carrier gas only flows through constriction 4. Thus the carrier gas does not in its entirety flow through both restrictions as called for in applicants amended independent claims 1, 11, 16, 19 and 26 and new independent claims 28 and 29.

Thus, Fassbinder does not teach, disclose or even suggest that which is taught and claimed by applicant in his amended independent claims 1, 11, 16, 19 and 26 and new independent claims 28 and 29. Claims 2-5 and 8-10 each depend on amended independent claim 1, claim 18 depends on amended independent claim 11, claims 20 and 23 each depend on amended independent claim 19 and claim 27 depends on amended independent claim 26 and each recite preferred forms of applicant's invention to which he is entitled to protection. Reconsideration of the rejection of the claims under 35 U.S.C. 102(b) is requested.

b) Rejections Under 35 U.S.C. 103(a)

The Examiner has rejected claims 6, 14, 21, 24 and 25 under 35 U.S.C. 103(a) as being upatentable over Fassbinder in view of U.S. Patent No. 6,314,821 (Allan). Claim 6 which depends on independent claim 1, claim 14 which depends on independent claim 11, claim 19 which depends on independent claim 19 each call for the first and second differential pressure switches to be connected in series. Claim 24 which depends on independent claim 19 calls for the switches to each have a predetermined actuation pressure and a selected resistance to flow and claim 25 which also depends directly on claim 19 calls for both switches to have a settable actuation pressure that is set to match the pressure drop through its associated restrictor for a given fluid flow rate through that restrictor.

In support of this rejection the Examiner says that Allan discloses in Figs. 3 and 6 a series circuit of two switches each of which has a predetermined actuation pressure. While Allan may teach a series circuit of two switches there is not any teaching in Allan that a fluid must in its entirety flow through the two restrictions of a sealed chamber. Therefore, Allan cannot and does teach, disclose or even suggest in any combination with Fassbinder that which is taught and claimed by applicant in his independent claims as amended herein and as added by this amendment. Reconsideration of this rejection is requested.

The Examiner has also rejected claims 6, 14, 21, 24 and 25 under 35 U.S.C. 103(a) as being upatentable over Fassbinder in view of U.S. Patent No. 6,164,142 (Dimeff). Since the Examiner says that these rejected claims all differ from Fassbinder in calling for a threaded outlet for the sealed chamber the Examiner must have meant claims 7, 15 and 22 as these claims all call for the threaded outlet and applicant will respond to this rejection under that presumption. In support of this rejection the Examiner says that Dimeff discloses a sealed chamber outlet that is threaded for attachment to an outlet pipe.

While Dimeff may teach a threaded outlet for a sealed chamber, it does not teach, disclose or even suggest that a fluid should in its entirety flow through the two restrictions of a sealed chamber. Therefore, Dimeff cannot and does teach, disclose or even suggest in any combination with Fassbinder that which is taught and claimed by applicant in his independent claims as amended herein and as added by this amendment. Reconsideration of this rejection is requested.

Prior Art Made Of Record And Not Relied Upon

The Examiner has cited U.S. Patents Nos. 6,446,513 and 4,926,698 saying that both disclose flow meters that use restrictors. Applicant has reviewed these additional references and none taken alone or in any combination with Fassbinder, Allan or Dimeff supply the teaching, disclosure or even

suggestion which is, as is described above, missing from those references.

Reconsideration of the application in accordance with Rules 111 and 112 is requested.

Petition and Fee For Extension of Time

Applicants also include herewith a Petition and Fee For Extension of Time asking that the period to respond to this Action be extended to four months from the date of the mailing of the Action viz., January 27, 2003. The required fee is to be charged to Deposit Account No. 05-0877.

Respectfully submitted,

Date: 1/17/03

Michael M. Rickin
Reg. No. 26,984
Attorney for Applicant(s)
ABB Inc.
29801 Euclid Avenue
Wickliffe, OH 44092-1832
(440) 585-7840

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to:

Commissioner For Patents
Washington, D.C. 20231

on the 17th day of January, 2003.

Respectfully,

Valerie R. Colley

Date 1/17/03

Ser. No. 10/092,773 Group Art Unit: 2855

Filed: March 7, 2002 Examiner: C. Dickens

Assignee: ABB Inc.

For: Flow Sensor

Docket No. E20020020

ATTACHMENT TO AMENDMENT UNDER RULE 111 AND PETITION AND FEE FOR EXTENSION OF TIME DATED JANUARY 17, 2003

Amendment to the Title as filed:

Fluid Flow Sensor

Amendment to the paragraph that starts at line 14 on page 1 of the application as filed:

In 1977 CENELEC established EN 50014 [50114] as a general set of standards to protect against explosions in potentially explosive atmospheres. Further information about EN 50 014 may be found in the publication of the Technical Committee CENELEC TC 31 entitled "Electrical apparatus for potentially explosive atmospheres General requirements" dated June 1997 and published by the CENELEC Central Secretariat, Rue de Stassart 35, B-1050 Brussels, Belgium. In addition, CENELEC also established EN 50016 to define the use of purged and pressurized equipment as a means of protection.

Amendment to the Summary of the Invention:

The present invention is an instrument that has an enclosure that has an opening through which a fluid can flow. The instrument also has first and second differential pressure switches. The instrument further has a sealed chamber in the opening. The chamber has an outlet and also has first and second restrictors through which the fluid [can] must flow in its entirety; and means for transferring the pressure in the

sealed chamber to the first and second differential pressure switches, the pressure in the enclosure to the first switch and the pressure at the sealed chamber outlet to the second switch.

The present invention is also a flow sensor for use in an instrument. The flow sensor has first and second differential pressure switches and a sealed chamber. The sealed chamber has an inlet and an outlet through which a fluid [can] must flow in its entirety; a flow restrictor in the inlet and a flow restrictor in the outlet; and means for transferring the pressure in the sealed chamber to the first and second differential pressure switches.

The present invention is also a flow sensor for use in an instrument. The flow sensor has a sealed chamber. The sealed chamber has an inlet and an outlet through which a fluid [can] must flow in its entirety; a flow restrictor in the inlet and a flow restrictor in the outlet; and means for transferring the pressure in the sealed chamber to first and second differential pressure switches.

The present invention is also the combination of an instrument that has an enclosure having an opening through which a fluid can flow and a flow sensor. The flow sensor has first and second differential pressure switches; and a sealed chamber in the opening, with the chamber having an outlet. The sealed chamber has first and second restrictors through which the fluid [can] must flow in its entirety; and means for transferring the pressure in the sealed chamber to the first and second differential pressure switches, the pressure in the enclosure to the first switch and the pressure at the sealed chamber outlet to the second switch.

The present invention is further an instrument that has an enclosure having an opening through which a fluid can flow. The instrument also has a first pressure transducer in the enclosure and a second pressure transducer outside of the enclosure. The instrument further has a sealed chamber in the opening and the chamber has an outlet. The sealed chamber has first and second

flow restrictors through which the fluid [can] must flow in its entirety. The chamber also has means for transferring the pressure in the sealed chamber to the first and second pressure transducers. The chamber further has means connected to the first and second pressure transducers for calculating for any given rate of flow of the fluid through the sealed chamber the flow through the outlet.

The present invention is a method for detecting the flow of a fluid through an enclosure having an outlet device through which the fluid can flow. The outlet device has a sealed chamber with first and second restrictors through which the fluid must flow in its entirety. The method transfers the pressure in the sealed chamber to first and second differential pressure switches; transfers the pressure in the enclosure to the first switch; and transfers the pressure outside of the enclosure to the second switch.

The present invention is also a method for detecting a blockage in the outlet of a purged enclosure having an outlet monitoring device in the outlet. The outlet monitoring device has a sealed chamber with first and second restrictors through which a purging fluid must flow in its entirety. The method flows the purging fluid into the enclosure; monitors at a first differential pressure switch the difference in pressure between the pressure in the enclosure and the sealed chamber that results from the purging fluid flow through the first restrictor of the outlet device; monitors at a second differential pressure switch the difference in pressure between the sealed chamber pressure and the pressure outside of the enclosure that results from the purging fluid flow through the second restrictor of the outlet device; and determines that either the first or second restrictors are blocked when the second or the first switches, respectively, are open when the purging fluid flows.

Amendment to the paragraph that starts at line 33 on page 4 of

the application as filed:

As is shown in the circuit diagram of Fig. 3 the two DPSs 26 and 28 are connected in the embodiment of the present invention shown in that figure in series. As can be appreciated the DPSs 26 and 28 may be connected in another configuration. If either DPS 26[,] or DPS 28 is open the series circuit is opened and the sensor 20 detects the lack of purge gas outlet flow from sensor 20.

Amendment to the paragraph that starts at line 4 on page 5 of the application as filed:

The sensor 20 ensures flow through the outlet of the enclosure 11 by utilizing a sealed chamber. If the sensor inlet restriction 22 is obstructed or blocked, the flow through the purge gas sensor 20 is reduced or eliminated. This reduces the pressure drop across the sensor outlet restriction 24 to a level that is below the actuation pressure of DPS 28. Since the two DPSs 26 and 28 are wired in series, the circuit opens and the lack of outlet flow is detected and thus sensor 20 meets the requirement of EN 50016 second edition as set forth in section 5.7 of that EN that the gas flow be monitored at the outlet of the enclosure 11.

Amendment to the paragraph that starts at the bottom of page 5 of the application as filed:

It should be appreciated that the restrictor pair 22, 24 also meets the requirement [in sections 3.1 and 3.2 of EN 50016 second edition] for a spark and [partial] particle barrier [of IP40].

Amendment to the paragraph that starts at line 2 of page 7 and the paragraph directly below the above paragraph that starts at line 15 of page 7 both of the application as filed:

It should be appreciated that the flow sensor of the present invention can be used to:

1. sense the presence of flow as long as the DPS actuation pressure is any value lower than the pressure differentials developed; and
2. sense the quantity of flow by either:
   a) selecting the resistance to flow of the restrictors 22, 24 so that the pressure drop for a given flow rate matches the actuation pressure of the DPS 26, 28; or
   b) setting the DPS actuation point so that it matches the pressure drop created by the restrictor 22, 24 for a given flow rate.

When the restrictors 22, 24 are each embodied by a screen cut into a circle, different screen mesh densities may be used to alter the performance of the device to achieve items 1 and 2 above. Different actuation pressure setpoints for the DPSs 26, 28 may be used to alter device performance to achieve items 1 and 2 above.

Amendment to Claims 1, 6, 11, 16, 19 and 26

1. (Amended) An instrument comprising:
   (a) an enclosure having an opening through which a fluid can flow;
   (b) first and second differential pressure switches; and
   (c) a sealed chamber in said opening, said chamber having an outlet and comprising:
      (i) first and second restrictors through which said fluid [can] must flow in its entirety; and
      (ii) means for transferring the pressure in said sealed chamber to said first and second differential pressure switches, the pressure in said enclosure to said first switch and the pressure at said sealed chamber outlet to said second switch.

6. (Amended) The instrument of claim 1 wherein said first

and second differential pressure switches are connected in series.

11. (Amended) A flow sensor for use in an instrument comprising:

(a) first and second differential pressure switches;

(b) a sealed chamber comprising:

(i) an inlet and an outlet through which a fluid [can] must flow in its entirety;

(ii) a flow restrictor in said inlet and a flow restrictor in said outlet; and

(iii) means for transferring the pressure in said sealed chamber to said first and second differential pressure switches.

16. (Amended) A flow sensor for use in an instrument comprising:

a sealed chamber comprising:

(i) an inlet and an outlet through which a fluid [can] must flow in its entirety;

(ii) a flow restrictor in said inlet and a flow restrictor in said outlet; and

(iii) means for transferring the pressure in said sealed chamber to first and second differential pressure switches.

19. (Amended) In combination:

(A) an instrument comprising an enclosure having an opening through which a fluid can flow;

(B) a flow sensor comprising:

(i) first and second differential pressure switches; and

(ii) a sealed chamber in said opening, said chamber having an outlet and comprising:

(a) first and second restrictors through which said fluid [can] must flow in its entirety; and

(b) means for transferring the pressure in said sealed chamber to said first and second

differential pressure switches, the pressure in said enclosure to said first switch and the pressure at said sealed chamber outlet to said second switch.

26. (Amended) An instrument comprising:

(a) an enclosure having an opening through which a fluid can flow;

(b) a first pressure transducer in said enclosure and a second pressure transducer outside of said enclosure;

(c) a sealed chamber in said opening, said chamber having an outlet and comprising:

(i) first and second flow restrictors through which said fluid [can] must flow in its entirety;

(ii) means for transferring the pressure in said sealed chamber to said first and second pressure transducers; and

(d) means connected to said first and second pressure transducers for calculating for any given rate of flow of said fluid through said sealed chamber the flow through said outlet.